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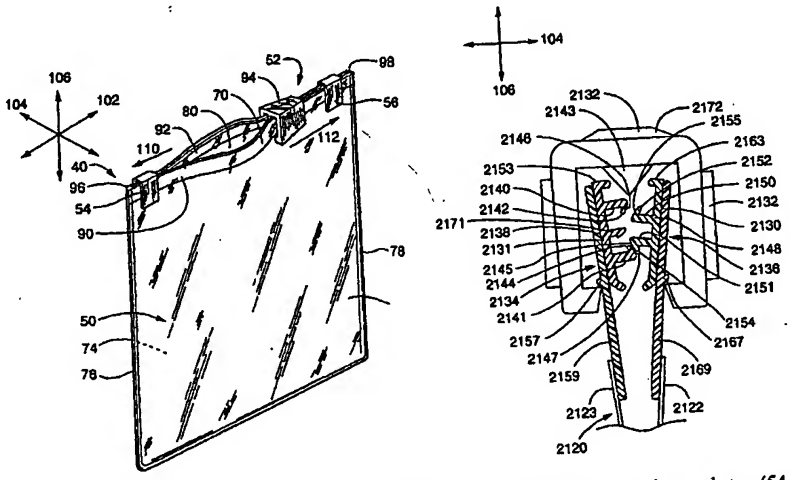

(57) Abstract: A container (40) is disclosed that includes a bag (50), a closure device (52), and an end stop (54, 56). The closure device (52) includes first and second interlocking fastening strips (90, 92) and a slider (94) slidably disposed on the fastening strips (90, 92) for facilitating the occlusion (110, 112) of the fastenig strip (90, 92). The end stop (54, 56) is mounted in complementary relation to the closure device (52) and includes a seal portion (120, 112). The end stop (54, 56) is connectively sealed to the bag (50) in a sealing process. The seal portion (120, 112) can be made from a material with a melting temperature lower than the rest of the end stop (54, 56) and/or can be made with a shape that is configured to melt more rapidly than the rest of the end stop (54, 56). The end stop (54, 56) can be made by co-extruding the seal portion (120, 122) and the rest of the end stop (54, 56) or by other known methods. The end stop (54, 56) can have several different configurations.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

END STOP FOR CLOSURE DEVICE

FIELD OF THE INVENTION

The present invention relates generally to closure devices and, more particularly, to an end stop used with a closure device. The invention is particularly well suited for use on flexible storage containers, including plastic bags.

BACKGROUND OF THE INVENTION

The use of closure devices for fastening storage containers, including plastic bags, is generally known. Furthermore, the manufacture of closure devices made of plastic materials is generally known to those skilled in the art, as demonstrated by the numerous patents in this area.

A particularly well-known use for closure devices is in connection with flexible storage containers, such as plastic bags. In some instances, the closure device and the associated container are formed from thermoplastic materials, and the closure device and the side walls of the container are integrally formed by extrusion as a single piece. Alternatively, the closure device and side walls of the container can be formed as separate pieces and then connected by heat sealing or any other suitable connecting process. In either event, such closure devices are useful in providing a closure means for retaining matter within the bag.

Conventional closure devices typically utilize mating fastening strips or closure elements which are used to selectively seal the bag.

A slider may be proved for use in opening and closing the fastening strips. The slider may include a separator which extends at least partially between the fastening strips. When the slider is moved in the appropriate direction, the separator separates or deoccludes the fastening strips and opens the bag.

When the fastening strips are occluded and deoccluded, the seams of the side walls are subjected to stress. Further, when a slider is used with the fastening strips, the slider can translate along the fastening strips until it abuts either seam. The interaction of the slider with either seam also subjects the seams to stress. The seam stress can cause the seams to fail and split which limits the usefulness of the bag. In addition, an end stop is provided to prevent the slider from being removed from the fastening strips by sliding off of the ends of the fastening strips. The present invention is directed toward a container having an end stop mounted to a bag and also toward the structure of the end stop that acts to attach the end stop to the bag.

SUMMARY OF THE INVENTION

According to the teachings of the present invention, the container includes a bag and a closure device with a pair of end stops. The bag includes a pair of flexible side walls joined together by a pair of seams. The closure device includes interlocking fastening strips disposed along respective edge portions of the side walls and a slider slidably disposed on the interlocking fastening strips for facilitating the occlusion and deocclusion of the fastening strips when moved towards first and second ends thereof. An end stop is disposed at each end of the fastening strips. The end stops are provided to prevent the slider from being removed from the fastening strips and to protect the seams from separating.

A container, constructed according to the teachings of the present invention, is provided with an end stop connectively sealed to the container by a sealing process. To facilitate the sealing process, the end stop is provided with a seal portion. When the end stop is mounted to the fastening strips, the seal portion is adjacent the container. The seal portion is sealed to the

container in the sealing process. To provide a reduced manufacture time during the sealing process, the seal portion can be made from a material with a melting temperature lower than the rest of the end stop and/or can be made with a shape that is configured to melt more rapidly than the rest of the end stop. The rest of the end stop, i.e., the body portion, remains unsealed with respect to the bag. The end stop including the body portion and the seal portion can be made by co-extrusion, for example. The end stop can be mounted on the fastening strips such that the longitudinal axis of the end stop is parallel to the longitudinal axis of the fastening strips.

To make the end stop with the seal portion, a flat piece of stock with a desired profile can be provided. The stock is formed into a hasp with a desired shape by using a heated mandrel, for example. The hasp is mounted to a bag assembly. A seal wire is passed through the mounted hasp and the bag assembly to cut the hasp and the bag assembly, defining a pair of first and second end stops, and a pair of first and second seams. A second hasp is mounted to the bag assembly and is placed in predetermined, spaced relation to the first seam. The bag assembly and the second hasp are moved with respect to the seal wire. The seal wire is passed through the second hasp and the bag assembly, defining third and fourth end stops and third and fourth seams. A sealing process can be used to connectively seal the hasps, or the pairs of end stops cut from the hasps, to the bag assembly. The container made includes the second seam, the second end stop, the third end stop, the third seam, and a portion of the bag assembly disposed between the second and the third seams.

The present invention will become more readily apparent upon reading the following detailed description of exemplified embodiments and upon reference to the accompanying drawings herein.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a container according to the present invention in the form of a plastic bag;

FIG. 2 is a fragmentary top plan view of the container in FIG. 1;

FIG. 3 is a fragmentary elevational front view of the container in FIG. 1;

FIG. 4 is a view in section of the container taken along the line 4-4 in FIG. 3 and illustrates that the end stop is co-extruded with a U-shaped seal portion;

FIG. 5 is a view in section of another embodiment of the container taken along the line 5-5 in FIG. 3 and illustrates a co-extruded end stop with a pair of depending seal portions;

FIG. 6 is a fragmentary elevational front view of another embodiment of the container wherein the end stop has a pair of seal portions, each seal portion including a pair of flanges flanking the body portion;

FIG. 7 is a view in section of the container taken along the line 7-7 in FIG. 6;

FIG. 8 is a fragmentary elevational front view of another embodiment of the container wherein the end stop includes a pair of seal portions each having a plurality of protrusions;

FIG. 9 is a view in section of the container taken along the line 9-9 in FIG. 8;

FIG. 10 is an end profile view of a flat piece of stock;

FIG. 11 is an end profile view of the flat piece of stock formed into a U-shaped hasp;

FIG. 12 is a front view of a bag assembly upon which hasps are mounted to make a container including end stops;

FIG. 13 is a perspective view of another embodiment of the end stop shown with a plurality of recesses;

FIG. 14 is a perspective view of another embodiment of the end stop shown with a plurality of channels defining an array of seal surfaces;

FIG. 15 is a perspective view of another embodiment of the end stop shown with a plurality of protrusions;

FIG. 16 is a fragmentary elevational front view of another embodiment of the container wherein the end stop includes a pair of seal portions each having an opening extending therethrough;

FIG. 17 is a view in section of the container taken along the line 17-17 in FIG. 16;

FIG. 18 is a view in section of the container taken along the line 18-18 in FIG. 16;

FIG. 19 is a fragmentary elevational front view of another embodiment of the container wherein the end stop is made from two pieces;

FIG. 20 is a view in section of the a plurality of channels taken along the line 20-20 in FIG. 19;

FIG. 21 is a view in section of another embodiment of the container taken along line 21-21 in FIG. 19;

FIG. 22 is a perspective view of another embodiment of the container wherein the end stop is side-mounted;

FIG. 23 is a fragmentary top plan view of the container in FIG. 22;

FIG. 24 is a cross-sectional view of an embodiment of a container;

FIG. 25 is a cross-sectional view of another embodiment of a container;

FIG. 26 is a cross-sectional view of another embodiment of a container; and

FIG. 27 is a cross-sectional view of another embodiment of a a container.

DESCRIPTION OF THE EMBODIMENTS

In summary, a container, constructed according to the teachings of the present invention, includes a bag and is provided with an end stop connectively sealed to the bag by a sealing process, such as, heating or ultrasonic fusing, for example. To facilitate the sealing process, the end stop is provided with a seal portion.

When the end stop is mounted to the bag, the seal portion is adjacent the bag. The seal portion is sealed to the bag in the sealing process. To provide a reduced manufacture time during the sealing process, the seal portion can be made from a material with a melting temperature lower than the rest of the end stop and/or can be made with a shape that is configured to melt more rapidly than the rest of the end stop. The rest of the end stop, i.e., the body portion, remains unsealed with respect to the bag. The end stop can be made by co-extrusion, for example.

Turning to the Figures, FIG. 1 illustrates an embodiment of a container 40 in the form of a plastic bag 50 having a sealable closure device 52, a first end stop 54 and a second end stop 56.

The bag 50 includes a top end 70, a first side wall 72 and a second side wall 74 joined at first and second seams 76, 78 to define a compartment 80 accessible through the open top end 70 but sealable by means of the closure device 52.

The closure device 52 includes a first fastening strip 90, a second fastening strip 92, a slider 94, a first end 96, and a second end 98. The fastening strips 90, 92 and the slider 94 have a longitudinal X axis 102, a transverse Y axis 104 and a vertical Z axis 106. The transverse Y axis 104 is perpendicular to the longitudinal X axis 102. The vertical Z axis 106 is perpendicular to the longitudinal X axis 102 and the vertical Z axis 106 is perpendicular to the transverse Y axis 104.

To allow the bag 50 to be opened and closed, the first and second fastening strips 90, 92 are provided. The first fastening strip 90 is attached to the first side wall 72 near the top end 70 of the bag 50. The second fastening strip 92 is attached to the second side wall 74 near the top end 70 of the bag 50. The fastening strips 90, 92 are located across from and substantially

parallel to each other and are configured to allow the fastening strips 90, 92 to be able to interlock. Interlocking the strips occludes the strips and closes the top end 70. Separating the interlocked fastening strips deoccludes the strips and opens the top end 70.

To facilitate the occlusion and deocclusion of the fastening strips 90, 92, the slider 94 is provided. The slider 94 is mounted onto the fastening strips 90,92 so that the slider 94 is restrained from being removed from the fastening strips 90, 92 but free to slide along the X axis 102. The slider 94 engages the fastening strips 90, 92 so that moving the slider in the appropriate direction along the X axis 102 either occludes or deoccludes the fastening strips 90, 92.

Referring to FIG. 1, in the illustrated embodiment, when the slider 94 moves toward the first end 96 in an occlusion direction 110, the fastening strips 90, 92 are interlocked. When the slider 94 moves toward the second end 98 in a deocclusion direction 112, the fastening strips 90, 92 are separated. The slider 94 includes a separator. The separator acts as a wedge to separate the fastening strips 90, 92 when the slider 94 moves in the deocclusion direction 112. The occlusion and deocclusion directions 110, 112 are substantially parallel to the X axis 102. When the slider 94 is at the first end 96, the bag 50 is sealed. When the slider 94 is at the second end 98, the bag 50 is fully open.

To prevent the slider 94 from being removed from the ends and to protect the seams 76, 78, the first and second end stops 54, 56 are disposed on the fastening strips 90, 92. The respective first and second end stops 54, 56 are adjacent the first and second ends 96, 98 of the fastening strips 90, 92. The end stops 52, 54 increase the durability of the closure device 52 and the bag 50.

Referring to FIGS. 1-4, the illustrative end stops 54, 56 are top-mounted. Referring to FIG. 1, the end stops 54, 56 are U-shaped and disposed on the fastening

strips 90, 92 such that the longitudinal axes of the end stops 54, 56 are substantially parallel to the Z axis 106. The first end stop 54 is adjacent the first end 96. The slider 94 can translate along the X axis 102 in the occlusion direction 110 until the slider 94 contactingly engages the first end stop 54. The first end stop 54 prevents the slider 94 from moving further in the occlusion direction 110. The second end stop 56 is adjacent to the second end 98. The slider 94 can translate in the deocclusion direction 112 until the slider 94 contactingly engages the second end stop 56. The second end stop 56 prevents the slider 94 from moving further in the deocclusion direction 112. The end stops 54, 56 can retain the slider 94 on the fastening strips 90, 92 such that the slider 94 can translate between the end stops 54, 56 and such that the end stops 54, 56 prevent the slider 94 from contactingly engaging the seams 76, 78.

Referring to FIG. 2, the second end stop 56 is mounted onto the bag 50 at the top end 70. The end stop 56 straddles the fastening strips 90, 92. The end stop 56 is attached to the bag 50 such that the end stop 56 is fixed in place a distance 99 from the second end 98. Referring to FIGS. 1 and 2, the end stop 56 can be attached to one or both of the fastening strips 90, 92 and/or to one or both of the side walls 72, 74. Referring to FIG. 2, the fastening strips 90, 92 are occluded between the second end stop 56 and the second end 98. Referring to FIG. 3, the end stop 56 projects above the top end 70 and below the fastening strips 90, 92.

Referring to FIG. 1, according to the teachings of the present invention, the end stops 54, 56 are connectively sealed to the first and second side walls 72, 74, respectively, of the bag 50. The end stops 54, 56 are sealed to the bag 50 by a sealing process, such as, heating or ultrasonic fusing, for example. The sealing process includes subjecting each end stop to energy such

that an interior molten surface on the end stop is produced. The molten surface is placed in contact with the bag 50 and interacts with a portion of the bag 50 with which the molten surface is in contact to form a connective seal, i.e., a mechanical connection, between the end stop and the bag.

Referring to FIG. 4, the end stop 56 includes a body portion 120 and a seal portion 122. Both the body and the seal portions 120, 122 are U-shaped. The seal portion 122 is coextensive with the body portion 120 along the Z axis 106. The seal portion 122 is in contacting relation with the fastening strips 90, 92. The body portion 120 and the seal portion 122 can be made from different materials.

The end stop 56 can be made, for example, by co-extrusion wherein the body portion 120 is extruded by an extruder and the seal portion 122 is extruded by an extruder at, or near, the same time such that the extruded portions 120, 122 can be fitted together and joined together as the portions cool. One extruder, or a plurality of extruders, can be used to make the extruded portions 120, 122. The body portion 120 and the seal portion 122 remain distinct from each other after co-extrusion.

The seal portion 122 can be used to connectively seal the end stop 56 to the bag 50 and can be configured to provide a molten seal surface 124 when the end stop 56 is subjected to the sealing process. To provide a reduced manufacture time for the container, the seal portion 122 can be made from a material with a melting temperature lower than the melting temperature of the body portion 120. For example, in the case where the body portion 120 is made from medium density polyethylene (MDPE), the seal portion 122 can be made from a material such as ethyl vinyl acetate (EVA), low density polyethylene, or very low density polyethylene.

To attach the end stop 56 to the bag 50, the end stop 56 can undergo the sealing process, such as, heating, for

example. As the end stop 56 is heated, a melting temperature is reached where the seal surface 124 of the seal portion 122 becomes molten. The molten seal surface 124 can interact with the fastening strips 90, 92 to connectively seal the end stop 56 to the fastening strips 90,92. Optionally, a clamping force parallel to the Y axis 104 can be applied adjacent a pair of lower ends 126, 128 of the end stop 56 such that the ends 126, 128 are moved toward each other and into contacting relation with the first and second side walls 72, 74, respectively. The clamping force can be applied until the molten surface 124 interacts with the side walls 72, 74 to connectively seal the end stop 56 to the side walls 72, 74.

Because the seal portion 122 has a melting temperature lower than that of the body portion 120, the seal surface 124 becomes molten at a point in time when the body portion 120 is not molten. Accordingly, the body portion 120 is not part of the connective seal, which is between the seal portion 122 and the fastening strips 90, 92 and/or the seal portion 122 and the side walls 72, 74. In other words, the body portion 120 is unattachedly free from the fastening strips 90, 92 and the side walls 72, 74. Further, an end stop including a body portion and a seal portion can be attached to the bag in less time and with less heat than would be required to attach an end stop made entirely from the material used for the body portion, i.e., without a seal portion.

FIGS. 3 and 5 depict another embodiment of a container 140 and illustrate an end stop 156 with a body portion 220 and first and second seal portions 222, 224. The end stop 156 can be made, for example, by co-extruding the body portion and the seal portions 220, 224, 226. An upper end 228 of the first seal portion 222 can be attached to, and aligned with, a first end 230 of the body portion 220. An upper end 232 of the second seal portion 224 can be attached to, and aligned with, a second end 234 of the body portion 220. The first and second seal

portions 222, 224 depend from the body portion 220 and oppose each other. The first and second side walls 172, 174 are interposed between the seal portions 222, 224 and are respectively adjacent to the first and second seal portions 222, 224.

The seal portions 222, 224 can be made from a material with a lower melting temperature than the material of the body portion 220. To attach the end stop 156 to the bag 150, the end stop 156 can undergo a sealing process, such as heating, for example. The end stop 156 can be heated such that first and second seal surfaces 235, 236 of the first and second seal portions 222, 224, respectively, become molten. The seal portions 222, 224 will become molten before the body portion 220. The end stop 156 can be heated to a point where the portions 222, 224 are molten but the portion 220 is solid.

The end stop 156 can be connectively sealed to the side walls 172, 174. A clamping force parallel to the Y axis 104, for example, can be applied to the seal portions 222, 224 adjacent a pair of respective lower ends 237, 238 such that the lower ends 237, 238 are moved toward each other and into contacting relation with the first and second side walls 172, 174, respectively. The clamping force can be applied until the molten first and second seal portions 222, 224 interact with the first and second side walls 172, 174, respectively, to connectively seal the end stop 56 to the bag 150.

FIGS. 6 and 7 depict another embodiment of a container 240 and illustrate an end stop 256. The end stop 256 includes a U-shaped, central body portion 320 that straddles the fastening strips 290, 292. Referring to FIG. 7, the end stop 256 includes a plurality of flange-like seal portions 322, 324, 326, 328. A first pair of the seal portions 322, 324 and a second pair of the seal portions 326, 328 project from opposing sides of the body portion 320 adjacent the first and the second side walls 272, 274, respectively. The seal portions 322,

324, 326, 328 flank the central body portion 320. Referring to FIG. 6, each seal portion 322, 324, 326, 328 extends downward along the Z axis 106 a predetermined distance from the top end 270 of the bag 250. The illustrative end stop 256 has seal portions that coterminate with first and second lower ends 329, 330 of the body portion 320. Referring to FIG. 7, the seal portions 322, 324, 326, 328 can be made from the same material as the body portion 320. The end stop 256 can be made by injection molding, machining, or forming, for example.

Referring to FIG. 7, to attach the end stop 256 to the bag 250, the end stop 256 can undergo a sealing process, such as, heating, for example. The body portion 320 is in contacting relation with the side walls 272, 274. The first pair of seal portions 322, 324, is in contacting relation with the first side wall 272. The second pair of seal portions 326, 328 is in contacting relation with the second side wall 274. Because the seal portions 322, 324, 326, 328 have a smaller cross-section along the Y axis 104 than the body portion 320, the seal portions have less mass to impede the sealing process. Because the seal portions 322, 324, 326, 328 flank the body portion 320, the seal portions act to insulate the body portion from the sealing process. Consequently, seal surfaces 334, 335, 336, 337 of the respective seal portions 322, 324, 326, 328 can reach a melting temperature at a point in time when the body portion 320 remains solid. The end stop 256 can be connectively sealed to the first side wall 272 by the first pair of seal portions 322, 324 and to the second side wall 274 by the second pair of seal portions 326, 328. The body portion 320 can remain in a solid state during the sealing process and is not a part of the connective seal.

Alternatively, heat can be specifically directed only to the seal portions 322, 324, 326, 328 during the sealing process. Similarly, the seal surfaces 334, 335, 336, 337

of the respective seal portions 322, 324, 326, 328 will reach a melting temperature while the body portion 320 remains solid. Once the seal portions 322, 324, 326, 328 become molten, they can be connectively sealed to the side walls 272, 274.

In another embodiment, the seal portions 322, 324, 326, 328 can be made from a material with a lower melting temperature than the body portion 320.

FIGS. 8 and 9 depict another embodiment of a container 340 and illustrate an end stop 356. Referring to FIG. 9, the end stop 356 includes a body portion 420 and first and second seal portions 422, 424. The body portion 420 is U-shaped. The seal portions 422, 424 both include a plurality of protrusions 426. The protrusions 426 of the first and second seal portions 422, 424 project from the body portion 420 along the Y axis 104 toward the first and second side walls 372, 374, respectively. Each protrusion 426 has a rectangular cross-section in the Y-Z plane, as shown in FIG. 9. Each protrusion 426 of the first and second seal portions 422, 424 has a seal surface 428 that is in respective contacting relation with the first and second side wall 372, 374. The respective protrusions 426 of the first and second seal portions 422, 424 are in predetermined, spaced relation with each other along the Z axis 106. Referring to FIG. 8, the protrusions 426 coincide with the body portion 420 along the X axis 102. The body portion 420 and the protrusions 426 can be made from the same material.

Referring to FIG. 9, to connectively seal the end stop 356 to the bag 350, the end stop 356 can undergo a sealing process, such as, ultrasonic fusing, for example. The spaced relation of the protrusions 426 allows the protrusions 426 to vibrate, thereby increasing the efficiency of the ultrasonic energy to melt the protrusions 426. The seal surfaces 428 of the protrusions 426 become molten at a point in time when a surface 430 of the body portion 420, and the entire body portion 420, is

solid. The protrusions 426 of the first and second seal portions 422, 424 can interact with the first and second side walls 372, 374, respectively, to connectively seal the first seal portion 422 to the first side wall 372 and the second seal portion 424 to the second side wall 374. The body portion 420 remains in a solid state and is not part of the connective seal.

In another embodiment, the protrusions of the seal portions and the body portion can be made from different materials. The protrusions can be made from a material with a lower melting temperature than that of the body portion. The end stop can be made by co-extruding the body portion and the protrusions. The co-extruded end stop can be connectively sealed to the bag by a sealing process, such as, heating or ultrasonic fusing, for example. The protrusions can be connectively sealed to the side walls. The body portion can be excluded from the connective seal.

The illustrative end stop 356 shown in FIGS. 8 and 9 includes first and second seal portions 422, 424 each having three protrusions 426. Referring to FIG. 9 the protrusions 426 of the first seal portion 422 oppose the protrusions 426 of the second seal portion 424. It will be understood by one skilled in the art that in other embodiments, the number and/or the spaced relation of the protrusions of a seal portion can vary. Further, the seal portions of an end stop can have a different number of protrusions and/or a different spaced relationship between protrusions. It will also be understood that the shape of the protrusions can be varied. For example, the cross-sectional shape in the Y-Z plane of the protrusion can be, for instance, rectangular, square, or triangular. Similarly, the shape of the seal surfaces can be varied to be rectangular, square, triangular, or circular, for instance.

FIGS. 10-12 depict a method for manufacturing an end stop that is made by forming a flat piece of stock into a

U-shaped end stop. Referring to FIG. 10, a flat strip of stock 451 can be used to make an end stop. The stock 451 has a desired profile 453 and can be made by extrusion, co-extrusion, injection molding, or machining, for example. The illustrative stock 451 is made by co-extrusion and includes a body portion 455 and first and second seal portions 457, 459. To make a container with end stops, a plurality of flat strips of stock 451 can be provided.

Referring to FIG. 11, a U-shaped hasp 461 is shown. Each flat strip of stock 451 can be formed by being passed over a heated mandrel, for example, to form the hasp 461. The stock 451 can include a groove 463 to facilitate the forming step by providing stress relief.

Referring to FIG. 12, a first hasp 471 has been mounted to a bag assembly 473. The first hasp 471 can be connectively sealed to the bag assembly by a sealing process, such as heating or ultrasonic fusing, for example. The bag assembly 473 includes a continuous piece of plastic 477 with first and second continuous fastening strip ribbons 479, 481 mounted to opposing first and second upper ends 483, 485 of the plastic piece 477. The plastic piece 477 is folded such that the first and second fastening strip ribbons 479, 481 are aligned with each other.

A seal wire 487 has been used to cut the first hasp 471 and the bag assembly 473 to define a pair of first and second end stops 489, 491 and a pair of first and second seams 493, 495. The first and second end stops 489, 491 are flush with the first and second seams 493, 495, respectively. A second hasp 497 has been mounted to the bag assembly 473 a predetermined distance from the second seam 495. The second hasp 497 and the bag assembly 473 have been moved toward the seal wire 487 by moving in an assembly direction 499 parallel to the X axis 102.

The seal wire 487 can be passed through the second hasp 497 to form a pair of third and fourth end stops 501,

503 and a pair of third and fourth a fourth seams 505, 507. The container 509 thereafter made includes the second and third end stops 491, 501, the second and third seams 495, 505, and a portion 510 of the bag assembly 473 defined by the second and third seams 495, 505.

The second hasp 497 includes a tie 511. The tie offsets the pair of end stops 501, 503 from each other such that once the cutting operation occurs, the third and fourth end stops 501, 503 are each offset a distance 504, 506 from the third and fourth seams 505, 507, respectively.

A third hasp 513 is mounted to the bag assembly 473 and is placed in predetermined, spaced relation to the second hasp 497. The third hasp 513 is similar to the first hasp 471 and has a width, measured along the X axis 102, that is equivalent to twice the desired width of an end stop plus the width of the kerf made by the seal wire 487. To form a second container 515, shown in hidden lines 517, the third hasp 513 and the bag assembly 473 can be moved toward the seal wire 487 by moving in the assembly direction 499 and thereafter cut by the seal wire 487.

In other embodiments, the hasp can be sized to a desired width by cutting, for example, and then can be mounted to the bag assembly. The sizing step and the cutting step, as it relates to the hasp, can be omitted where the hasp is made to the desired width of an end stop. It will be understood that the forming, sealing, and cutting steps can be interchangeably performed in chronological order of operation.

FIGS. 13-15 depict other embodiments of an end stop that can be connectively sealed to a bag by a sealing process, such as, ultrasonic fusing, for example. The end stops shown in FIGS. 13-15 are exemplary of an end stop that is made by forming a generally flat strip of stock into a U-shaped piece of stock as described in FIGS. 10-

12. The end stops shown in FIGS. 13-15 have undergone the sizing step but have yet to undergo the forming step.

Referring to FIG. 13, another embodiment of an end stop 456 is shown. The end stop 456 can include a body portion 520 and first and second seal portions 522, 524. The body portion 520 can include a notch 526. The notch 526 can be used to align the end stop 526 in a former, such as a mandrel. The notch 526 can provide stress relief to facilitate forming the end stop 456 into a U-shape for placement on a bag. The body portion 520 and the seal portions 522, 524 can be made from the same material.

The seal portions 522, 524 both can include a plurality of recesses 528. The recesses 528 facilitate the connective sealing of the end stop 456 to a bag by a sealing process, such as, ultrasonic fusing, for example. The recesses 528 increase the amount of vibration in the seal portions 522, 524 relative to the body portion 520 when the end stop 456 is subjected to ultrasonic energy. As a result, first and second seal faces 530, 532 of the first and second seal portions 522, 524, respectively, become molten at a time when the body portion 520 is solid. The seal faces 530, 532 can interact with a bag to connectively seal the end stop 456 to the bag.

The first and second seal portions 522, 524 of the illustrative end stop 456 both include four recesses 528. In other embodiments, the number and/or configuration of the recesses with respect to both or either of the seal portions can vary.

In another embodiment the end stop can be made by co-extrusion. The seal portions, shown in hidden lines 534, 536 in FIG. 13, can be made from a material with a melting temperature lower than that of the body portion. The seal portions can be connectively sealed to a bag by a sealing process, such as heating or ultrasonic fusing, for example.

Referring to FIG. 14, another embodiment of an end stop 556 is shown. The end stop 556 can include a body portion 620 and first and second seal portions 622, 624. The body portion 620 of the end stop 556 shown in FIG. 14 is similar to the body portion 520 of the end stop 456 shown in FIG. 13. The body portion 620 and the seal portions 622, 624 can be made from the same material.

The first and second seal portions 622, 624 both can include a plurality of channels 628 that define an array of seal surfaces 630. When the end stop 556 is subjected to ultrasonic energy, for example, in a sealing process, the seal surfaces 630 on both seal portions 622, 624 vibrate at a frequency higher than that at which the body portion 620 vibrates. As a result, the seal surfaces 630 become molten at a time when the body portion 620 is solid. The seal surfaces 630 can interact with the bag 550 to connectively seal the end stop 556 to the bag 550.

In other embodiments, the number and/or configuration of the channels 628 with respect to both, or either, of the seal portions 622, 624 can vary. For example, rather than the channels defining square-shaped seal surfaces, the channels can be configured to define diamond-shaped, or other polygon-shaped, seal surfaces.

In another embodiment, the end stop can be made by co-extrusion. The seal portions, shown in hidden lines 634, 636 in FIG. 14, can be made from a material with a melting temperature lower than that of the body portion. The seal portions can be connectively sealed to a bag by a sealing process, such as heating or ultrasonic fusing, for example.

Referring to FIG. 15, another embodiment of an end stop 656 is shown. The end stop 656 can include a body portion 720 and first and second seal portions 722, 724. The body portion 720 of the end stop 656 shown in FIG. 15 is similar to the end stop 456 shown in FIG. 13. The body portion 720 and the seal portions 722, 724 can be made from the same material.

The seal portions 722, 724 both can include a plurality of nubs 728. The nubs 728 facilitate the integral attachment of the seal portions 722, 724 to a bag by a sealing process, such as, ultrasonic fusing. The nubs 728 vibrate at a frequency higher than that at which the body portion 520 vibrates when the end stop 656 is subjected to ultrasonic energy. As a result, the nubs 728 become molten at a time when the body portion 720 is solid. The nubs 728 can interact with the bag 650 to connectively seal the end stop 656 to the bag 650.

The illustrative end stop 656 has first and second seal portions 722, 724 both with four nubs 728. In other embodiments, the number and/or configuration of the nubs with respect to both, or either, of the seal portions can vary.

In another embodiment, the end stop can be made by co-extrusion. The seal portions, shown in hidden lines 734, 736 in FIG. 15, can be made from a material with a melting temperature lower than that of the body portion. The seal portions can be connectively sealed to a bag by a sealing process, such as heating or ultrasonic fusing, for example.

FIGS. 16-18 depict another embodiment of a container 740 and illustrate an end stop 756. Referring to FIG. 17, the end stop 756 includes a body portion 820 and first and second seal portions 822, 824. The body portion 820 is U-shaped. The first and second seal portions 822, 824 respectively depend from first and second legs 826, 828 of the body portion 820. The first and second seal portions 822, 824 are in respective contacting relation with the first and second side walls 772, 774. The body portion 820 and the seal portions 822, 824 can be made from the same material. Each seal portion 822, 824 includes an opening 830 extending therethrough. The longitudinal axis of the bore 830 is parallel to the Y axis 104.

To connectively seal the end stop 756 to the bag 750, the end stop 756 can undergo a sealing process, such as

heating, for example. The bores 830 of the first and second seal portions 822, 824 provide additional surface area to receive heat. The seal portions 822, 824 can reach a melting temperature more rapidly than the body portion 820 when subjected to the same amount of heat.

Referring to FIGS. 17 and 18, the end stop 756 can be heated such that first and second seal surfaces 832, 834 of the first and second seal portions 822, 824, respectively, become molten at a point in time when the body portion 820 remains solid. The molten first and second seal surfaces can be connectively sealed to the first and second side walls 772, 774, respectively. Accordingly the body portion 820 is not part of the connective sealing between the end stop 756 and the bag 750.

In another embodiment, the end stop can be made by co-extrusion. To accelerate the sealing process, seal portions, shown below a hidden line 840 in FIGS. 16 and 17, can be made from a material with a melting temperature lower than that of the body portion. The seal portions can be connectively sealed to a bag by a sealing process, such as heating, for example.

FIGS. 19 and 20 depict another embodiment of a container 840 and illustrate a multi-piece end stop 856 attached to a bag 850. Referring to FIG. 20, the end stop 856 includes a first piece 922 and a second piece 923. The first piece 922 includes a body portion 924 and an upper joining portion 925 and a lower seal portion 926. The second piece 923 includes a body portion 928 and an upper joining portion 929 and a lower seal portion 930. The upper joining portions 925, 929 of the first and second pieces 922, 923 are in contacting relation with each other. The lower seal portions 926, 930 of the first and second pieces 922, 923 are in contacting relation with the first and the second side walls 872, 874, respectively.

The body portions 924, 928 of the first and second pieces 922, 923 can be made from the same material. The body portions 924, 928 can be made from a material different than that of the upper joining portions 925, 929 and the lower seal portions 926, 930. The joining portion 925 and the seal portion 926 of the first piece 922 can be made from the same material. The joining portion 929 and the seal portion 930 of the second piece 923 can be made from the same material. The upper seal portions 925, 929 can be made from the same material. The lower seal portions 926, 930 can be made from the same material. Each of the joining and the seal portions 925, 929, 926, 930 can be made from a material with a melting temperature lower than the melting temperature of the material, or materials, used for the body portions 924, 928.

To make the end stop 856, both the first and second pieces 922, 923 can be made, for example, by co-extrusion. For instance, the body portion 924 and the upper joining portion 925 and the lower seal portion 926 can be co-extruded. The upper joining portion 925 of the first piece 922 is fitted with the body portion 922 such that the upper joining portion 925 is joined to an upper end 930 of the body portion 922. The upper joining portion 925 of the first piece 922 projects above the body portion 922 and is configured to matingly contact the upper joining portion 929 of the second piece 923. The lower seal portion 926 of the first piece 922 is fitted with the body portion 922 such that a lower end 932 of the lower seal portion 926 coterminates with a lower end 934 of the body portion 922 and such that the lower seal portion 926 is in contacting relation with the first side wall 872 when the end stop 856 is assembled.

The first and second pieces 922, 923 can be integrally joined together while the pieces 922, 923 are connectively sealed to the bag 850. To integrally join the first and second pieces 922, 923 together and to connectively seal the pieces 922, 923 to the bag 850, the

pieces 922, 923 can be placed in contacting relation with each other and the bag 850, as shown in FIG. 20. The first and second pieces 922, 923 can undergo a sealing process, such as heating, for example. As the pieces 922, 923 are heated, a melting temperature is reached where an upper fuse surface 936 and a lower seal surface 938 of the first piece 922 and an upper fuse surface 940 and a lower seal surface 942 of the second piece 923 become molten. The molten upper surfaces 936, 940 can interact with each other to integrally join the first and second pieces 922, 923 together, thereby forming the end stop 856. The molten lower seal surfaces 938, 942 of the first and second pieces 922, 923 can interact with the first and second side walls 872, 874, respectively, to connectively seal the end stop 856 to the bag 850.

The upper fuse surfaces 936, 940 and the lower seal surfaces 938, 942 become molten at a point in time when the body portions 924, 928 remain solid. Accordingly, the body portions 924, 928 are not part of the connective sealing between the end stop 856 and the bag 850.

Of course, it will be understood by one skilled in the art that the first and second pieces could be joined by other known methods, such as mechanical fastening, for example.

FIGS. 19 and 21 depict another embodiment of a container 940 and illustrate a multi-piece end stop 956 attached to a bag 950. Referring to FIG. 21, the end stop 956 includes a first piece 1022 and a second piece 1023. The first and second pieces 1022, 1023 both respectively include a body portion 1024, 1028 and a seal portion 1026, 1030. Each body portion 1024, 1028 has a respective mating surface 1032, 1034. The mating surfaces 1032, 1034 are in contacting relation with each other. Each seal portion 1026, 1030 has a respective seal surface 1033, 1035 that is in contacting relation with the first and the second side wall 972, 974, respectively.

The material and the attachment features of the end stop 956 are the same as those of the end stop 856 described in FIGS. 19 and 20 except in the manner which the pieces 1022, 1023 are attached to each other. The pieces 1022, 1023 can be attached to each other by attaching the body portions 1024, 1028 such that the mating surfaces 1032, 1034 are in contacting relation as shown in FIG. 21. The body portions 1024, 1028 can be joined together through the mating surfaces 1032, 1034 by a joining process, such as, mechanically fastening, gluing, or heating the mating surfaces 1024, 1028 with a local heat source to form an integral attachment between the mating surfaces 1032, 1034 where the heat source is located adjacent the surfaces 1032, 1034 such that the remainders of the body portions 1024, 1028 and the seal portions 1026, 1030 are not melted.

FIGS. 22 and 23 depict another embodiment of a container 1040 and illustrate a side-mounted end stop 1056 attached to a bag 1050. Referring to FIG. 23, the end stop 1056 is U-shaped and disposed on the first and second fastening strips 1090, 1092 such that the longitudinal axis of the end stop 1056 is substantially parallel to the X axis 102. The end stop 1056 straddles a second seam 1078 and a second end 1098. Referring to FIG. 22, a slider 1094 can translate in a deocclusion direction 1112 until the slider 1094 contactingly engages first and second contact ends 1130, 1132 of the end stop 1056. Referring to FIG. 23, the first and second contact ends 1130, 1132 are adjacent the first and second fastening strips 1090, 1092 respectively. Referring to FIG. 22, the contact ends 1130, 1132 provide a stop for the slider 1094 and prevent the slider 1094 from contacting the second seam 1078 when the slider 1094 moves in the deocclusion direction 1112.

The end stop 1056 can be made as a single piece by extrusion molding, co-extrusion molding, injection molding, machining, or forming, for example.

Alternatively, two or more pieces can be fused or mechanically fastened, for example, to form the end stop 1056. The end stop 1056 can include a body portion and a seal portion as described above.

An illustrative example of the type of closure device that can be used with the present invention is shown in FIG. 24. Referring to FIG 24, the exemplary closure device includes a first fastening strip 2130 with a first closure element 2136 and a second fastening strip 2131 with a second closure element 2134. The first closure element 2136 engages the second closure element 2134. The first fastening strip 2130 may include a flange 2163 disposed at the upper end of the first fastening strip 2130 and a rib 2167 disposed at the lower end of the first fastening strip 2130. The first fastening strip 2130 may also include a flange portion 2169. Likewise, the second fastening strip 2131 may include a flange 2153 disposed at the upper end of the second fastening strip 2131 and a rib 2157 disposed at the lower end of the second fastening strip 2131. The second fastening strip 2131 may also include a flange portion 2159. The side walls 2122, 2123 of the plastic bag 2120 may be attached to the fastening strips 2130, 2131 by conventional manufacturing techniques.

The second closure element 2134 includes a base portion 2138 having a pair of spaced-apart parallely disposed webs 2140, 2141, extending from the base portion 2138. The base and the webs form a U-channel closure element. The webs 2140, 2141 include hook closure portions 2142, 2144 extending from the webs 2140, 2141 respectively, and facing toward each other. The hook closure portions 2142, 2144 include guide surfaces 2146, 2147 which serve to guide the hook closure portions 2142, 2144 for occluding with the hook closure portions 2152, 2154 of the first closure element 2136. The closure element 2134 may include a color enhancement member 2171

which is described in U.S Patent 4,829,641 and which is incorporated by reference.

The first closure element 2136 includes a base portion 2148 including a pair of spaced-apart, parallely disposed webs 2150, 2151 extending from the base portion 2148. The base and the webs form a U-channel closure element. The webs 2150, 2151 include hook closure portions 2152, 2154 extending from the webs 2150, 2151 respectively and facing away from each other. The hook closure portions 2152, 2154 include guide surfaces 2145, 2155, which generally serve to guide the hook closure portions 2152, 2154 for occlusion with the hook closure portions 2142, 2144 of the second closure element 2134. The guide surfaces 2145, 2155 may also have a rounded crown surface.

A slider 2132 includes a top portion 2172. The top portion provides a separator 2143 having a first end and a second end wherein the first end may be wider than the second end. In addition, the separator 2143 may be triangular in shape. When the slider is moved in the deocclusion direction, the separator 2143 deoccludes the fastening strips 2130, 2131 as shown in FIG. 24. Referring to FIG. 24, the closure elements 2134, 2136 are deoccluded and specifically, the upper hook portions 2142, 2152 and the lower hook portions 2144, 2154 are deoccluded.

The interlocking fastening strips can be "arrowhead-type" or "rib and groove" fastening strips as shown in FIG. 25 and as described in U.S. Patent 3,806,998. The rib element 2305 interlocks with the groove element 2307. The rib element 2305 is of generally arrow-shape in transverse cross section including a head 2310 comprising interlock shoulder hook portions 2311 and 2312 generally convergently related to provide a cam ridge 2313 generally aligned with a stem flange 2314 by which the head is connected in spaced relation with respect to the supporting flange portion 2308. (U.S. Patent 3,806,998,

Col. 2, lines 16-23). At their surfaces nearest the connecting stem flange 2314, the shoulder portions 2311 and 2312 define reentrant angles therewith providing interlock hooks engageable with interlock hook flanges 2315 and 2317 respectively of the groove element 2307. (U.S. Patent 3,806,998, Col. 2, lines 23-28). Said hook flanges generally converge toward one another and are spread open to receive the head 2310 therebetween when said head is pressed into said groove element 2307 until the head is fully received in a groove 2318 of said groove element 2307 generally complementary to the head and within which the head is interlocked by interengagement of the head shoulder hook portions 2311 and 2312 and the groove hook flanges 2315 and 2317. (U.S. Patent 3,806,998, Col. 2, lines 28-36). Through this arrangement, as indicated, the head and groove elements 2305 and 2307 are adapted to be interlockingly engaged by being pressed together and to be separated when forcibly pulled apart, as by means of a generally U-shaped slider 2319. (U.S. Patent 3,806,998, Col. 2, lines 36-41).

The slider 2319 includes a flat back plate 2320 adapted to run along free edges 2321 on the upper ends of the sections of the flange portions 2308 and 2309 as shown in the drawing. (U.S. Patent 3,806,998, Col. 2, lines 41-46). Integrally formed with the back plate 2320 and extending in the same direction (downwardly as shown) therefrom are respective coextensive side walls 2322 with an intermediate spreader finger 2323 extending in the same direction as the side walls at one end of the slider. (U.S. Patent 3,806,998, Col. 2, lines 46-51). The side walls 2322 are in the form of panels which are laterally divergent from a narrower end of the slider. (U.S. Patent 3,806,998, Col. 2, lines 51-55). The slider walls 2322 are each provided with an inwardly projecting shoulder structure 2324 flange adapted to engage respective shoulder ribs 2325 and 2327 on respectively outer sides of

the lower section of the flange portions 2308 and 2309. (U.S. Patent 3,806,998, Col. 2, line 66 to Co. 3, line 3).

Additionally, the interlocking fastening strips may comprise "profile" fastening strips, as shown in FIG. 26 and described in U.S. Patent 5,664,299. As shown in FIG. 26, the first profile 2416 has at least an uppermost closure element 2416*a* and a bottommost closure element 2416*b*. (U.S. Patent 5,664,299, Col. 3, lines 25-27). The closure elements 2416*a* and 2416*b* project laterally from the inner surface of strip 2414. (U.S. Patent 5,664,299, Col. 3, lines 27-28). Likewise, the second profile 2417 has at least an uppermost closure element 2417*a* and a bottommost closure element 2417*b*. (U.S. Patent 5,664,299, Col. 3, lines 28-30). The closure elements 2417*a* and 2417*b* project laterally from the inner surface of strip 2415. (U.S. Patent 5,664,299, Col. 3, lines 30-32). When the bag is closed, the closure elements of profile 2416 interlock with the corresponding closure elements of profile 2417. (U.S. Patent 5,664,299, Col. 3, lines 32-34). As shown in FIG. 26, closure elements 2416*a*, 2416*b*, 2417*a*, 2417*b* have hooks on the ends of the closure elements, so that the profiles remain interlocked when the bag is closed, thereby forming a seal. (U.S. Patent 5,664,299, Col. 3, lines 34-37).

The straddling slider 2410 comprises an inverted U-shaped member having a top 2420 for moving along the top edges of the strips 2414 and 2415. (U.S. Patent 5,664,299, Col. 4, lines 1-3). The slider 2410 has sidewalls 2421 and 2422 depending from the top 2420. (U.S. Patent 5,664,299, Col. 4, lines 3-4). A separating leg 2423 depends from the top 2420 between the sidewalls 2421 and 2422 and is located between the uppermost closure elements 2416*a* and 2417*a* of profiles 2416 and 2417. (U.S. Patent 5,664,299, Col. 4, lines 26-30). The fastening assembly includes ridges 2425 on the outer surfaces of the fastening strips 2414 and 2415, and shoulders 2421*b*, 2422*b* on the side walls of the slider. (U.S. Patent 5,664,299,

Col. 4, lines 62-65). The shoulders act as means for maintaining the slider in straddling relation with the fastening strips by grasping the lower surfaces of the ridges 2425. (U.S. Patent 5,664,299, Col. 5, lines 4-7).

Also, the interlocking fastening strips may be "rolling action" fastening strips as shown in FIG. 27 and described in U.S. Patent 5,007,143. The strips 2514 and 2515 include profiled tracks 2518 and 2519 extending along the length thereof parallel to the rib and groove elements 2516 and 2517 and the rib and groove elements 2516, 2517 have complimentary cross-sectional shapes such that they are closed by pressing the bottom of the elements together first and then rolling the elements to a closed position toward the top thereof. (U.S. Patent 5,007,143, Col. 4, line 62 to Col. 5, line 1). The rib element 2516 is hook shaped and projects from the inner face of strip 2514. (U.S. Patent 5,007,143, Col. 5, lines 1-3). The groove element 2517 includes a lower hook-shaped projection 2517*a* and a relatively straight projection 3517*b* which extend from the inner face of strip 2515. (U.S. Patent 5,007,143, Col. 5, lines 3-6). The profiled tracks 2518 and 2519 are inclined inwardly toward each other from their respective strips 2514 and 2515. (U.S. Patent 5,007,143, Col. 5, lines 6-8).

The straddling slider 2510 comprises an inverted U-shaped plastic member having a back 2520 for moving along the top edges of the tracks 2518 and 2519 with side walls 2521 and 2522 depending therefrom for cooperating with the tracks and extending from an opening end of the slider to a closing end. (U.S. Patent 5,007,143, Col. 5, lines 26-31). A separator finger 2523 depends from the back 2520 between the side walls 2521 and 2522 and is inserted between the inclined tracks 2518 and 2519. (U.S. Patent 5,007,143, Col. 5, lines 34-36). The slider 2510 has shoulders 2521*a*, 2522*a* projecting inwardly from the depending sidewalls 2521, 2522 which are shaped throughout the length thereof for cooperation with the depending

separator finger 2523 in creating the rolling action in opening and closing the reclosable interlocking rib and groove profile elements 2516 and 2517. (U.S. Patent 5,007,143, Col. 5, lines 43-49).

Although several interlocking fastening strip embodiments have been specifically described and illustrated herein, it will be readily appreciated by those skilled in the art that other kinds, types, or forms of fastening strips can alternatively be used without departing from the scope or spirit of the present invention.

The interlocking fastening strips may be manufactured by extrusion through a die and may be formed from any suitable thermoplastic material including, for example, polyethylene, polypropylene, nylon, or the like, or from a combination thereof. Thus, resins or mixtures of resins such as high-density polyethylene, medium density polyethylene, and low-density polyethylene may be employed to prepare the interlocking fastening strips.

When the fastening strips are used in a sealable bag, the fastening strips and the films that form the body of the bag may be conveniently manufactured from heat sealable material. In this way, the bag may be economically formed by using an aforementioned thermoplastic material and by heat sealing the fastening strips to the bag. For example, the bag may be made from a mixture of high pressure, low-density polyethylene and linear, low-density polyethylene.

The fastening strips may be manufactured by extrusion or other known methods. For example, the closure device may be manufactured as individual fastening strips for later attachment to the bag or may be manufactured integrally with the bag. In addition, the fastening strips may be manufactured with or without flange portions on one or both of the fastening strips depending upon the intended use of the fastening strips or expected additional manufacturing operations. The slits may be cut

during the manufacturing of the fastening strips using rollers which contain an appropriately placed knife edge.

Generally, the fastening strips can be manufactured in a variety of forms to suit the intended use. The fastening strips may be integrally formed on the opposing sidewalls of the container or bag, or connected to the container by the use of any of many known methods. For example, a thermoelectric device may be applied to a film in contact with the flange portion of the fastening strips or the thermoelectric device may be applied to a film in contact with the base portion of fastening strips having no flange portion, to cause a transfer of heat through the film to produce melting at the interface of the film and a flange portion or base portion of the fastening strips. Suitable thermoelectric devices include heated rotary discs, traveling heater bands, resistance-heated slide wires, and the like. The connection between the film and the fastening strips may also be established by the use of hot melt adhesives, hot jets of air to the interface, ultrasonic heating, or other known methods. The bonding of the fastening strips to the film stock may be carried out either before or after the film is U-folded to form the bag. In any event, such bonding may be done prior to side sealing the bag at the edges by conventional thermal cutting. In addition, the first and second fastening strips may be positioned on opposite sides of the film. Such an embodiment would be suited for wrapping an object or a collection of objects such as wires. The first and second fastening strips should usually be positioned on the film in a generally parallel relationship with respect to each other, although this will depend on the intended use.

The slider may be multiple parts and snapped together. In addition, the slider may be made from multiple parts and fused or welded together. The slider may also be a one-piece construction. The slider can be colored, opaque, translucent or transparent. The slider

may be injection molded or made by any other method. The slider may be molded from any suitable plastic material, such as, nylon, polypropylene, polystyrene, acetal, toughened acetal, polyketone, polybutylene terrephthalate, high density polyethylene, polycarbonate or ABS (acrylonitrile-butadiene-styrene).

From the foregoing it will be understood that modifications and variations may be effectuated to the disclosed structures – particularly in light of the foregoing teachings – without departing from the scope or spirit of the present invention. As such, no limitation with respect to the specific embodiments described and illustrated herein is intended or should be inferred. In addition, all references and copending applications cited herein are hereby incorporated by reference in their entireties.

WHAT IS CLAIMED IS:

1. A closure device comprising:

a first fastening strip and a second fastening strip; and

an end stop mounted to the fastening strips, the end stop including a seal portion connectively sealed to the first fastening strip and a body portion being unattachedly free from the first and the second fastening strips;

the closure device having a longitudinal X axis and a transverse Y axis, the transverse Y axis being perpendicular to the longitudinal X axis, the container having a vertical Z axis, the vertical Z axis being perpendicular to the longitudinal X axis, the vertical Z axis being perpendicular to the transverse Y axis.

2. The invention as in claim 1 wherein the seal portion of the end stop comprises a first material having a first melting temperature and the body portion of the end stop comprises a second material having a second melting temperature, the first melting temperature being lower than the second melting temperature.

3. The invention as in claim 2 wherein the end stop is made by co-extruding the seal portion and the body portion.

4. The invention as in claim 3 wherein the seal portion is U-shaped and is interposed between the body portion and the first side wall.

5. The invention as in claim 3 wherein the seal portion depends from the body portion.

6. The invention as in claim 3 wherein the seal portion includes a plurality of protrusions.

7. The invention as in claim 6 wherein each protrusion projects along the Y axis toward the first side wall and extends along the X axis to coincide with the body portion, the protrusions being in spaced relation to each other along the Z axis.

8. The invention as in claim 3 wherein the seal portion includes a plurality of recesses.

9. The invention as in claim 3 wherein the seal portion includes a plurality of channels defining an array of seal surfaces.

10. The invention as in claim 3 wherein the seal portion includes a plurality of nubs.

11. The invention as in claim 3 wherein the seal portion includes an opening extending therethrough.

12. The invention as in claim 3 wherein the seal portion of the end stop comprises a first shape and the body portion of the end stop comprises a second shape, the first shape being configured to melt more rapidly than the second shape.

13. The invention as in claim 2 wherein the body portion comprises medium density polyethylene (MDPE), and the seal portion comprises a material, wherein the material is selected from the group consisting of ethyl vinyl acetate (EVA), low density polyethylene, and very low density polyethylene.

14. The invention as in claim 1 wherein the seal portion of the end stop comprises a first shape and the body portion of the end stop comprises a second shape, the first shape being configured to melt more rapidly than the second shape.

15. The invention as in claim 14 wherein the seal portion of the end stop includes a pair of flanges flanking the body portion, each flange longitudinally extending along the Z axis, each flange thinner along the Y axis than the body portion.

16. The invention as in claim 14 wherein the seal portion includes a plurality of protrusions.

17. The invention as in claim 16 wherein each protrusion projects along the Y axis toward the first side wall and extends along the X axis to coincide with the body portion, the protrusions being in spaced relation to each other along the Z axis.

18. The invention as in claim 14 wherein the seal portion includes a plurality of recesses.

19. The invention as in claim 14 wherein the seal portion includes a plurality of channels defining an array of seal surfaces.

20. The invention as in claim 14 wherein the seal portion includes a plurality of nubs.

21. The invention as in claim 14 wherein the seal portion includes a bore extending therethrough.

22. The invention as in claim 1 wherein the first and the second fastening strips are joined together by a first seam and a second seam, and the end stop is mounted on the fastening strips such that the end stop straddles one of the first and the second seams.

23. The invention as in claim 1 wherein the end stop is made from a first piece and a second piece.

24. The invention as in claim 23 wherein the first piece and the second piece each include a mating portion.

25. The invention as in claim 1 wherein the end stop is made from a flat piece of stock with a desired profile formed into a desired shape.

26. The invention as in claim 25 wherein the flat piece of stock is made by co-extruding the seal portion and the body portion.

27. The invention as in claim 25 wherein the desired shape is U-shaped.

28. The invention as in claim 1 further comprising:

a slider adapted to be slidably disposed on the fastening strips and facilitating the occlusion of the fastening strips when moved towards a first end thereof and facilitating the deocclusion of the fastening strips when moved towards a second end thereof.

29. The invention as in claim 1 wherein the first and the second fastening strips comprise U-channel type fastening strips.

30. The invention as in claim 1 wherein the fastening strips comprise arrowhead type fastening strips.

31. The invention as in claim 1 wherein the fastening strips comprise profile type fastening strips.

32. The invention as in claim 1 wherein the fastening strips comprise rolling action type fastening strips.

33. A method of manufacturing a container comprising:

providing a first side wall and a second side wall, the first side wall includes a first fastening strip, the second side wall includes a second fastening strip;

providing a first end stop mounted to the first side wall, the end stop including a seal portion and a body portion; and

sealing the end stop to the first fastening strip by a sealing process wherein the seal portion is connectively sealed to the first fastening strip and the body portion is unattachedly free from the first and the second fastening strips.

34. The method of manufacturing a container as in claim 33 wherein in the end stop step, the end stop is made by a method of manufacture comprising:

providing a flat piece of stock with a desired profile; and

forming the stock into a desired shape.

35. The method of manufacturing a container as in claim 34 wherein in end stop step, the forming step of the method of manufacture is performed by bending the stock around a heated mandrel.

36. The method of manufacturing a container as in claim 34 wherein in the end stop step, the method of manufacture further comprises:

sizing the stock to a desired width.

37. The method of manufacturing a container as in claim 36 wherein in end stop step, the sizing step of the method of manufacture is performed by cutting the stock.

38. The method as in claim 33 wherein the sealing process comprises heating.

39. The method as in claim 33 wherein the sealing process comprises ultrasonic fusing.

40. The method of manufacturing a container as in claim 33 further comprising:

providing a slider adapted to be slidably disposed on the fastening strips and facilitating the occlusion of the fastening strips when moved towards a first end thereof and facilitating the deocclusion of the fastening strips when moved towards a second end thereof.

41. A container comprising:

a first side wall and a second side wall joined together by a first seam and a second seam, the first side wall includes a first fastening strip, the second side wall includes a second fastening strip, and

an end stop mounted on the fastening strips such that the end stop straddles one of the first and the second seams.

42. The container as in claim 41 wherein the container has a longitudinal X axis and a transverse Y axis, the transverse Y axis being perpendicular to the longitudinal X axis, the container includes a vertical Z axis, the vertical Z axis being perpendicular to the longitudinal X axis, the vertical Z axis being perpendicular to the transverse Y axis, and the end stop includes a longitudinal axis, the longitudinal axis being substantially parallel to the longitudinal X axis.

43. The container as in claim 41 further comprising:

a slider adapted to be slidably disposed on the fastening strips and facilitating the occlusion of the fastening strips when moved towards a first end thereof and facilitating the deocclusion of the fastening strips when moved towards a second end thereof.

44. A container comprising:

a first side wall and a second side wall, the first side wall includes a first fastening strip, the second side wall includes a second fastening strip; and

an end stop mounted to the fastening strips, the end stop including a seal portion connectively sealed to the first fastening strip and a body portion being unattachedly free from the first and the second fastening strips;

the container having a longitudinal X axis and a transverse Y axis, the transverse Y axis being perpendicular to the longitudinal X axis, the container having a vertical Z axis, the vertical Z axis being perpendicular to the longitudinal X axis, the vertical Z axis being perpendicular to the transverse Y axis.

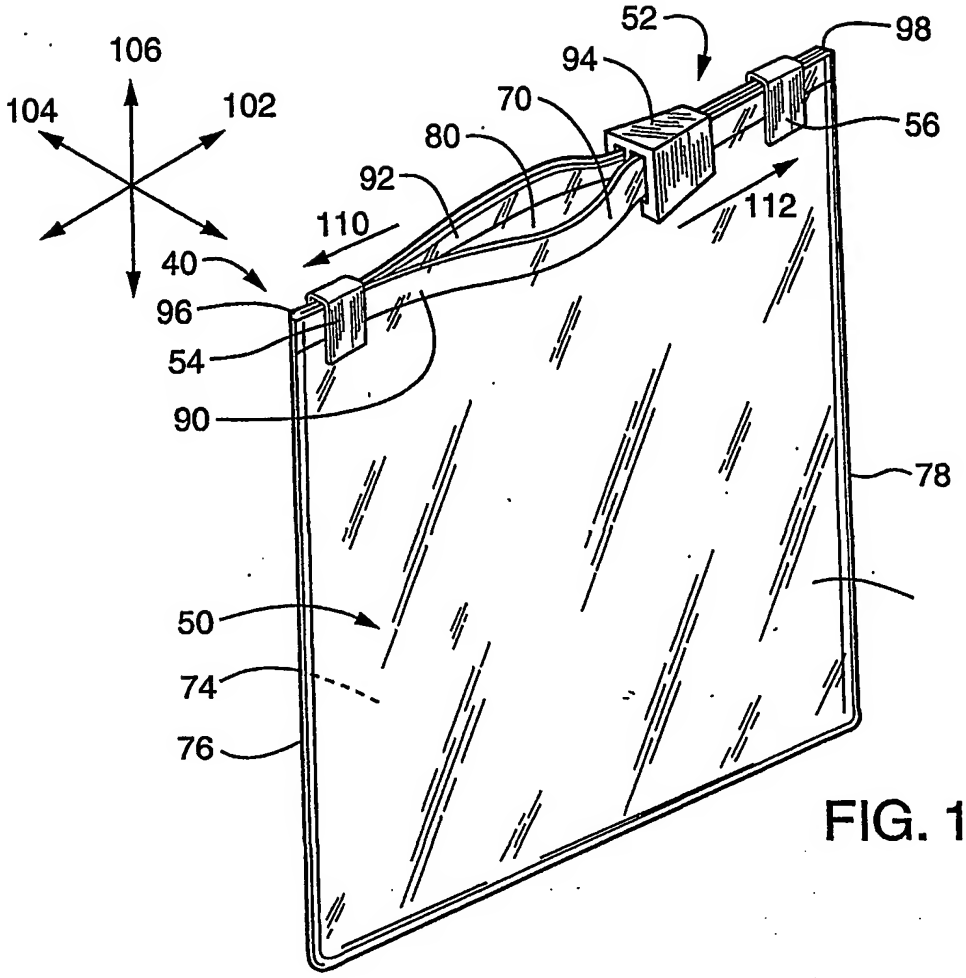
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FIG. 1

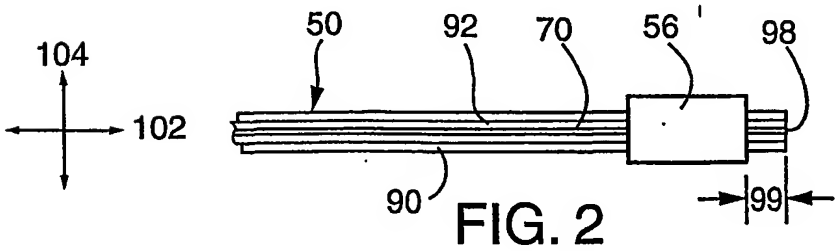
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FIG. 2

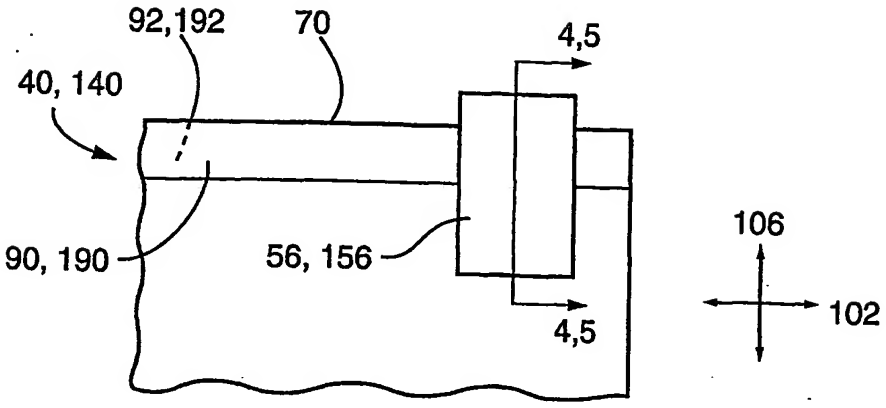


FIG. 3

FIG. 4

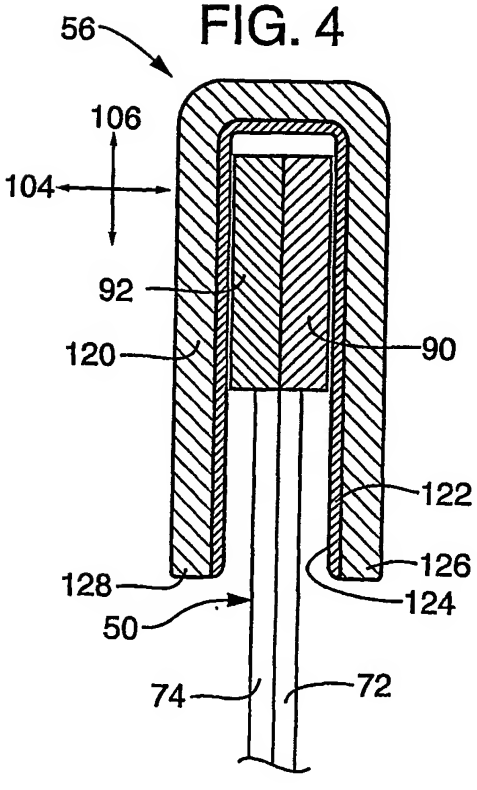
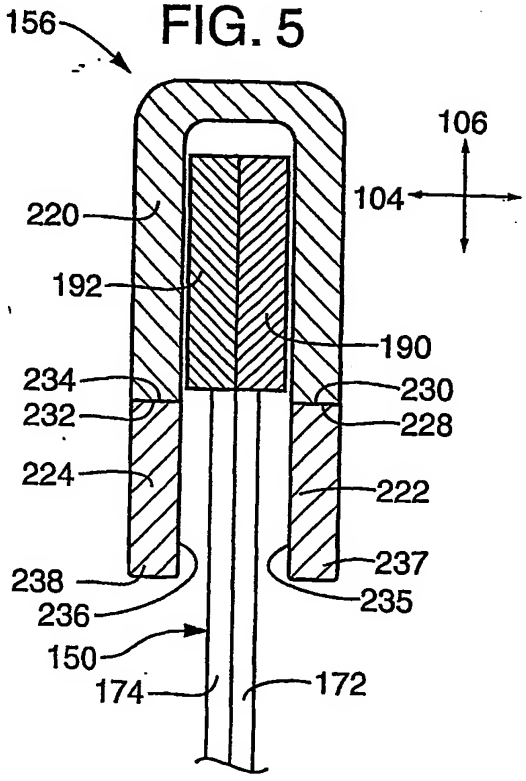


FIG. 5



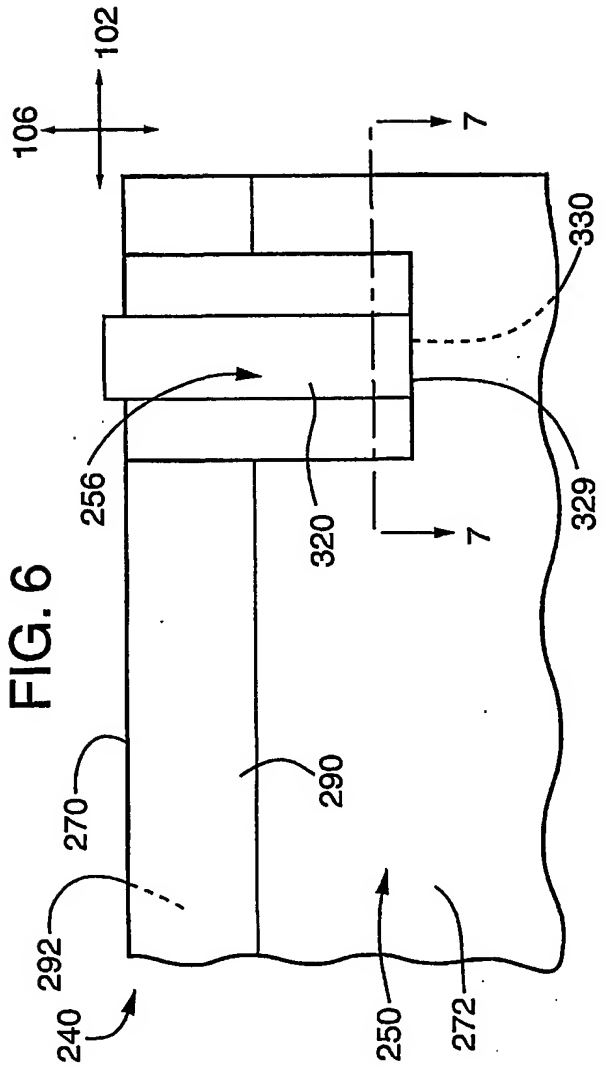

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FIG. 6

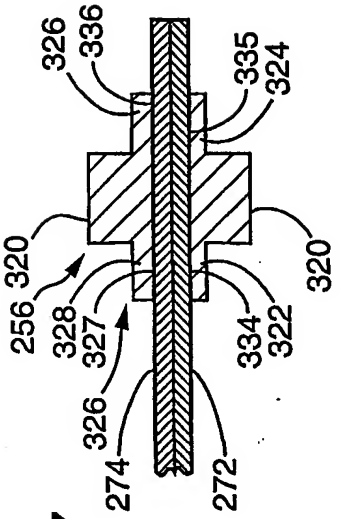
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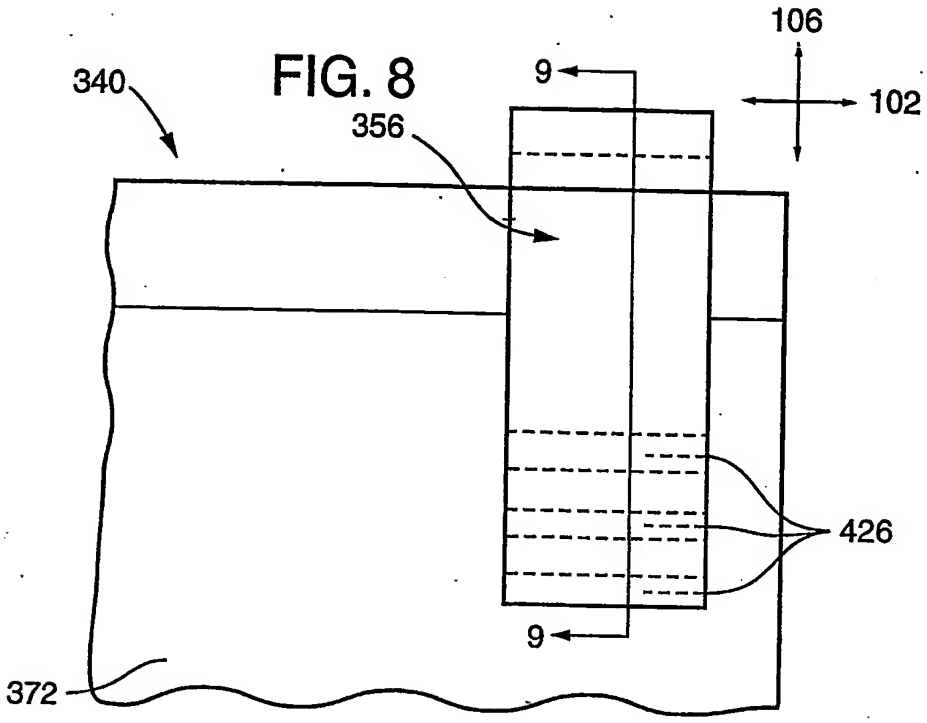
FIG. 7

FIG. 8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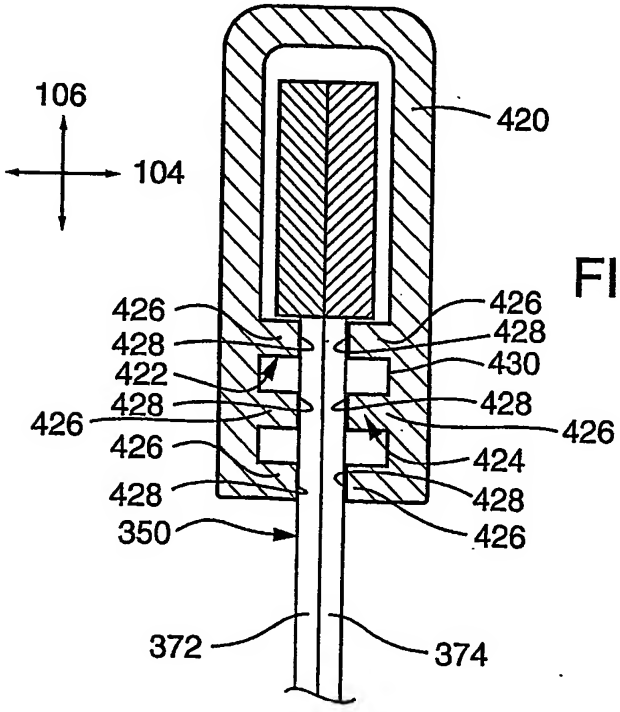
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FIG. 9

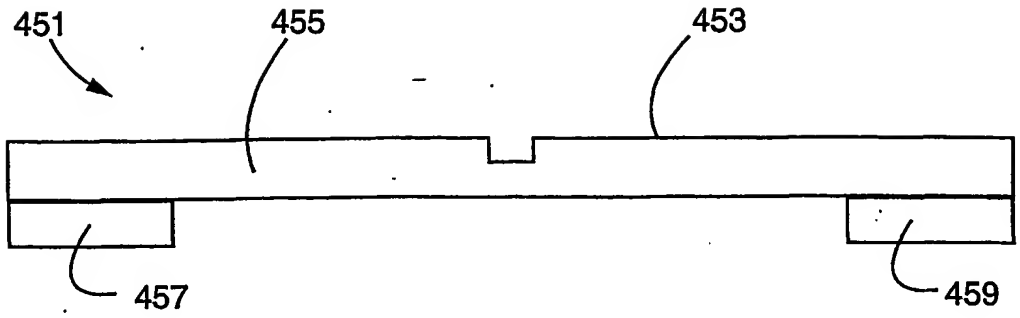
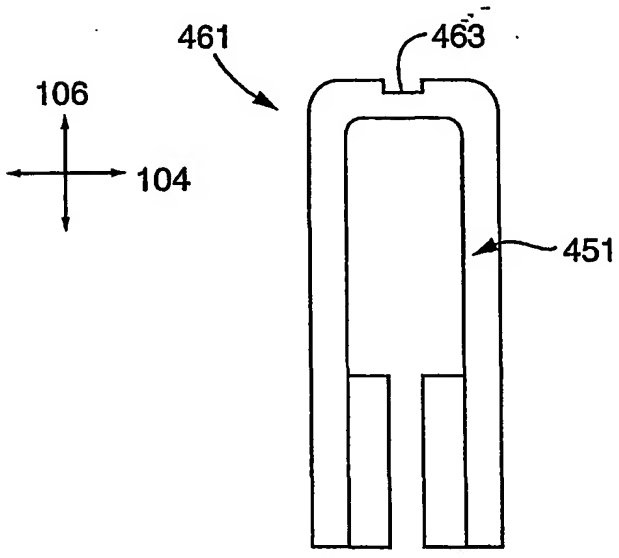


FIG. 10



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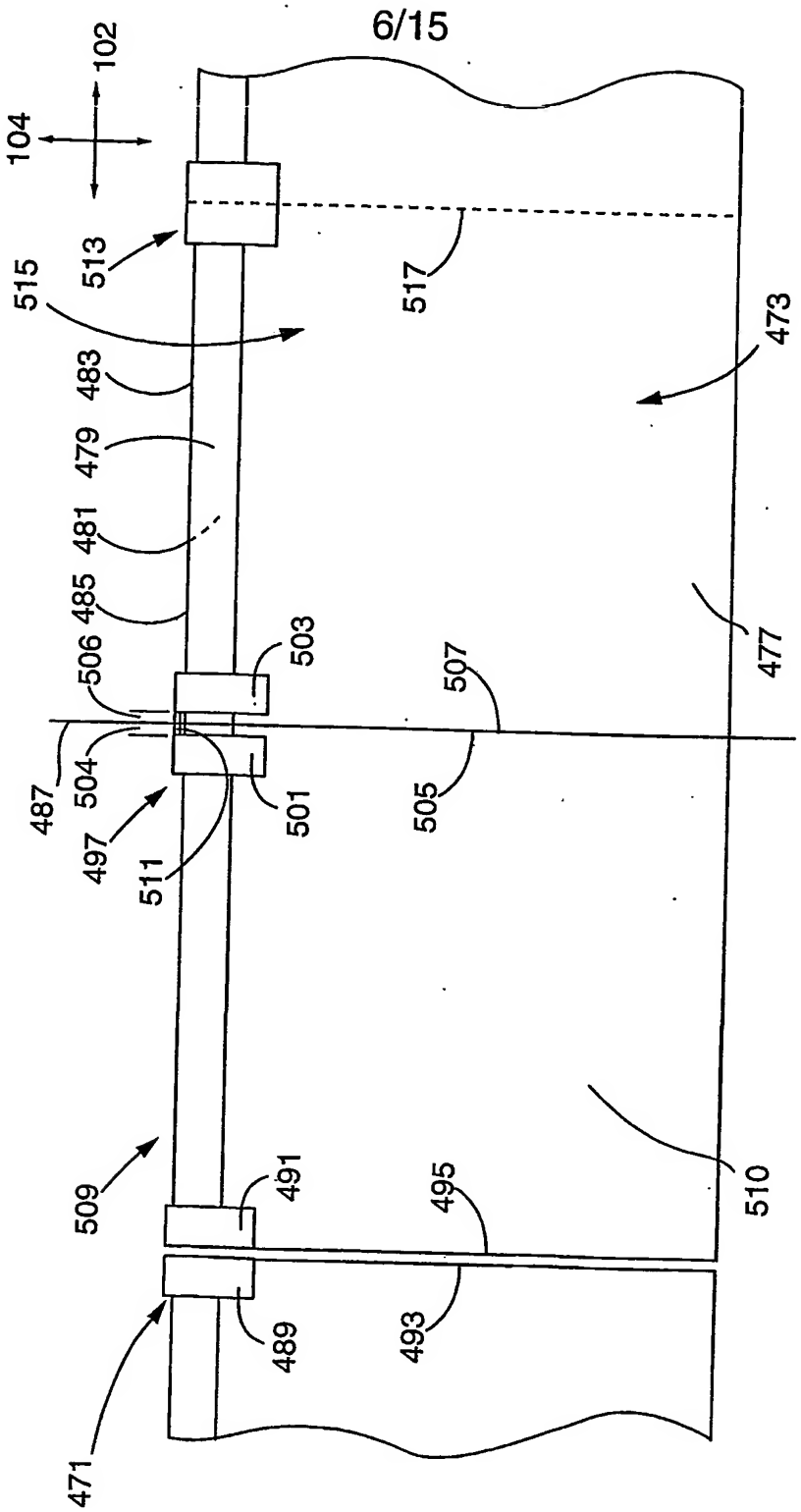
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FIG. 12

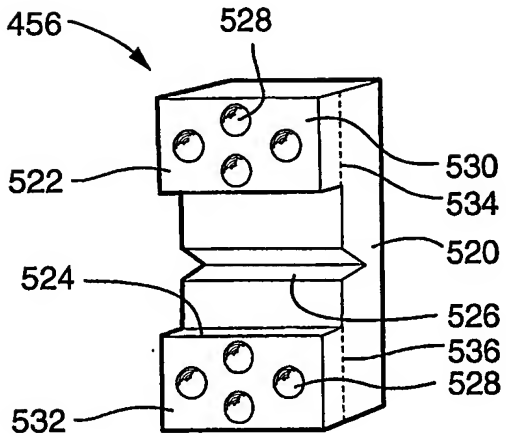


FIG. 13

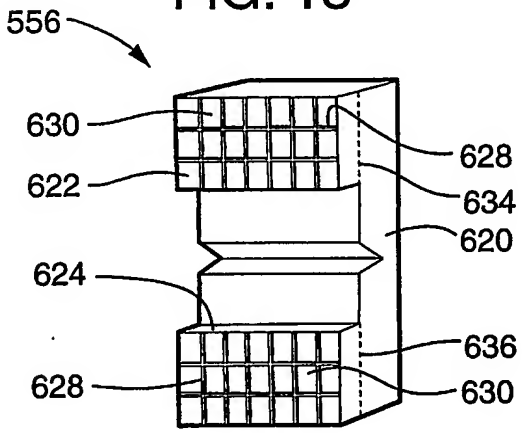


FIG. 14

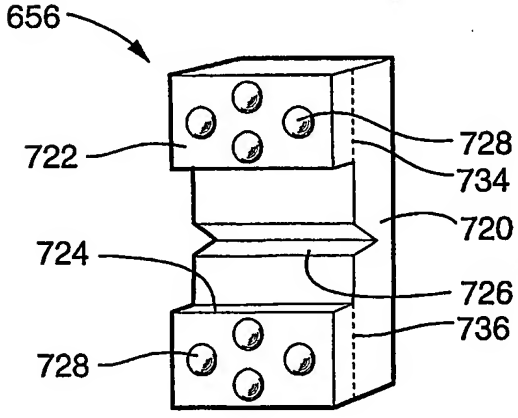
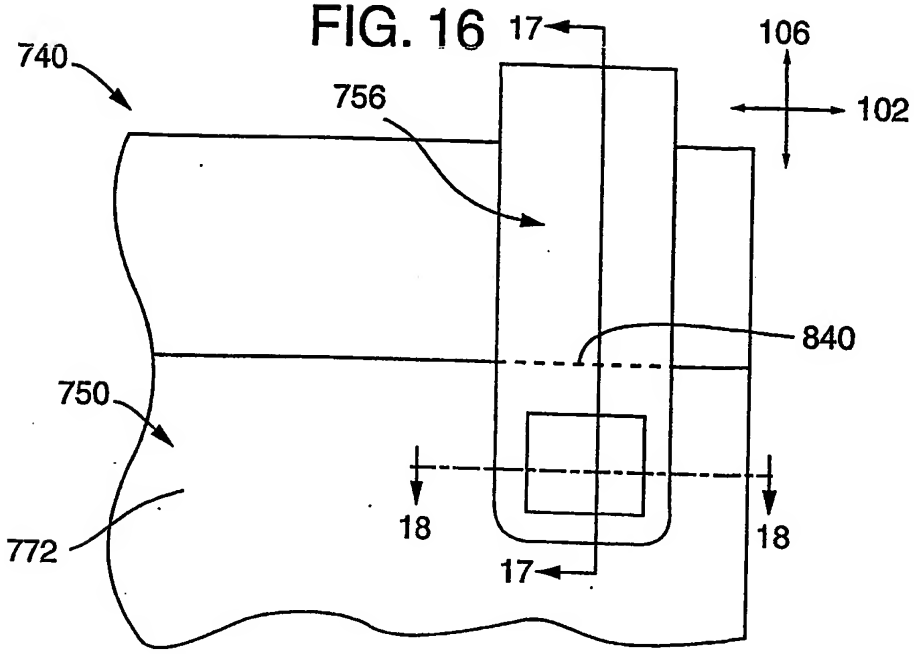


FIG. 15

FIG. 16



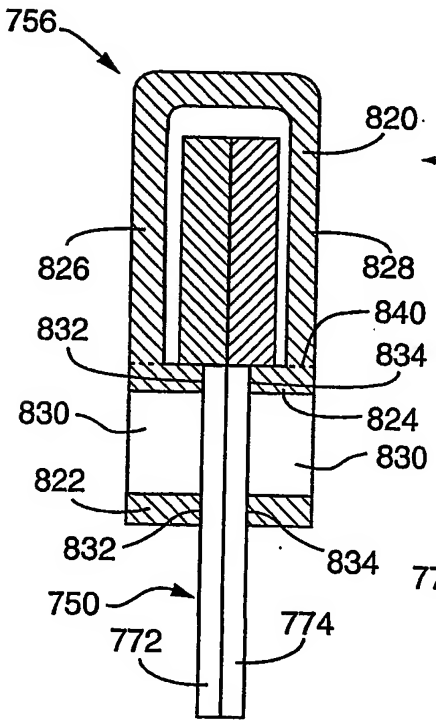


FIG. 17

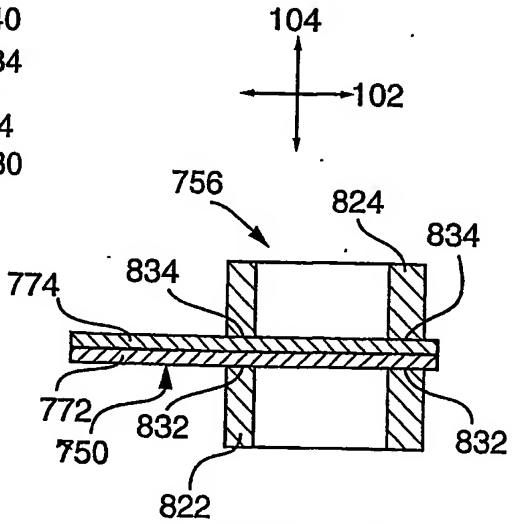


FIG. 18

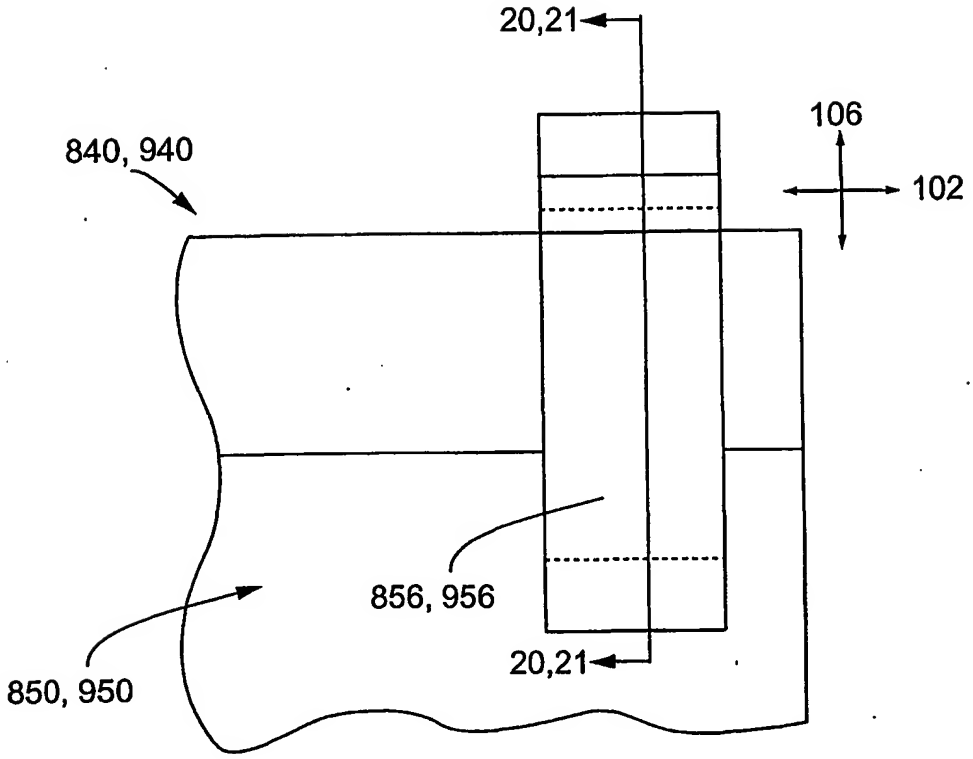


FIG. 19

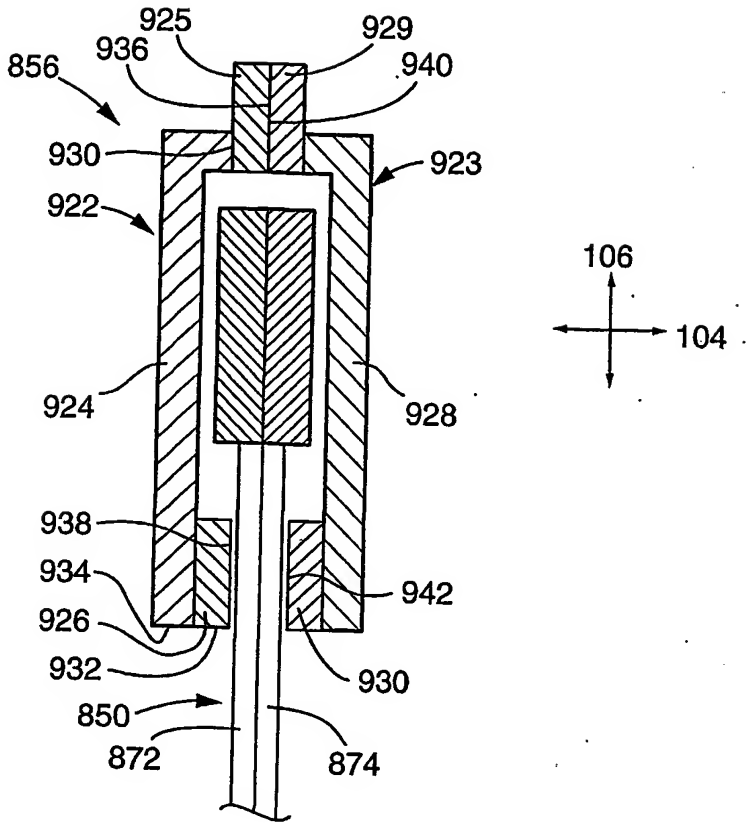

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FIG. 20

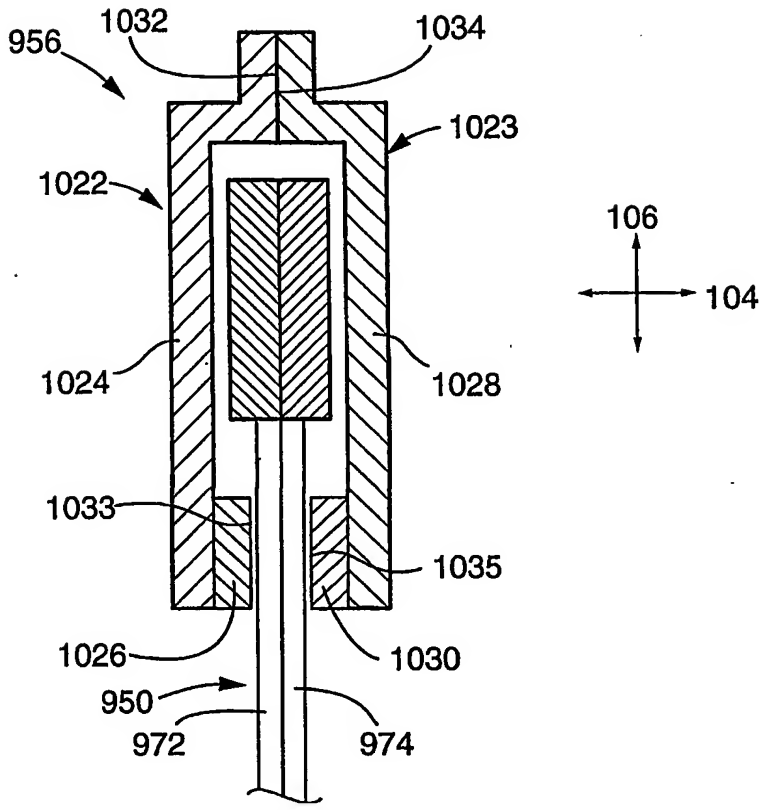
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FIG. 21

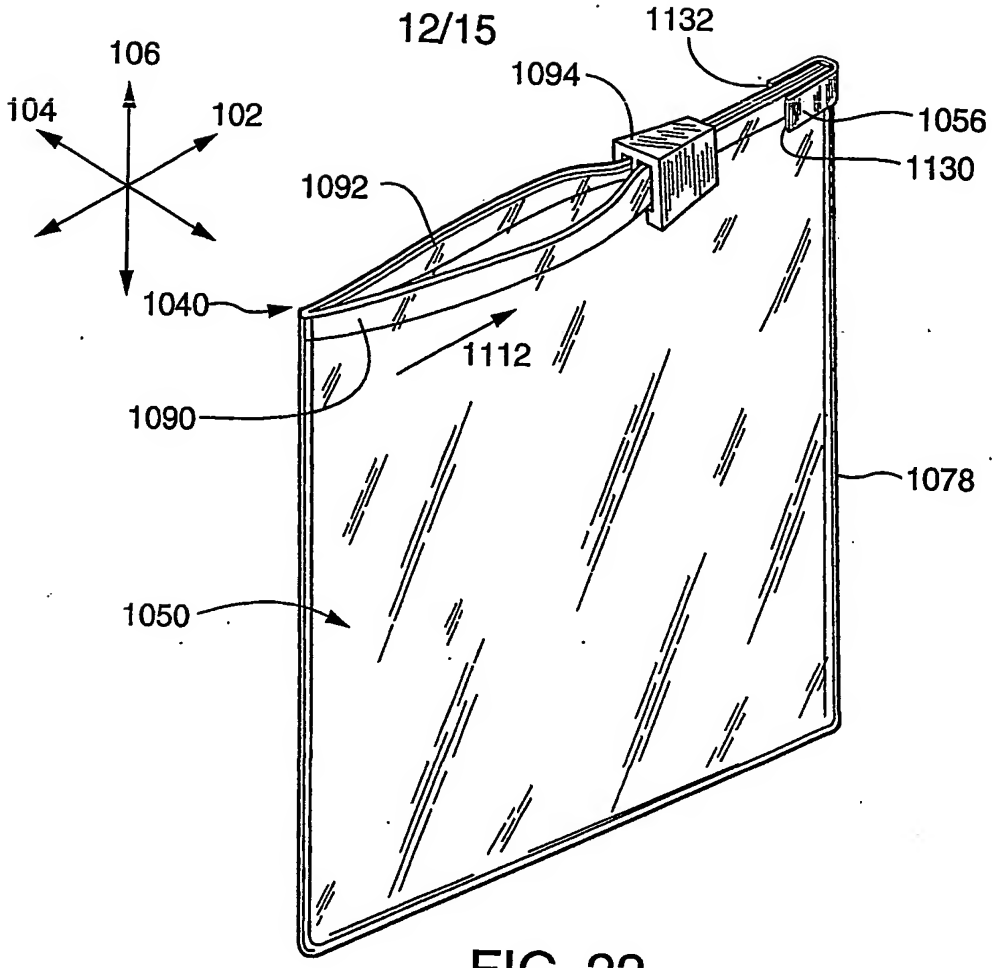
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FIG. 22

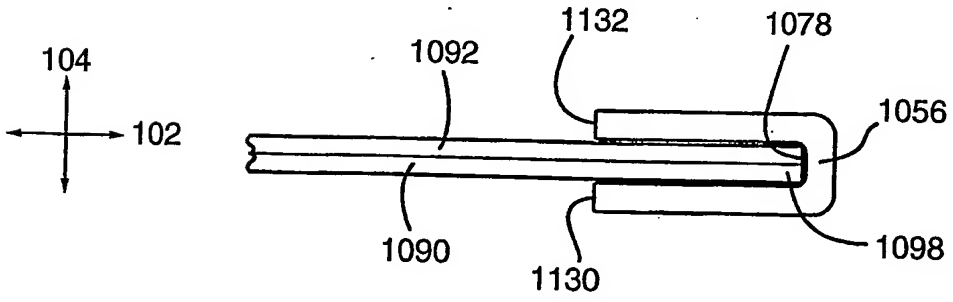
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FIG. 23

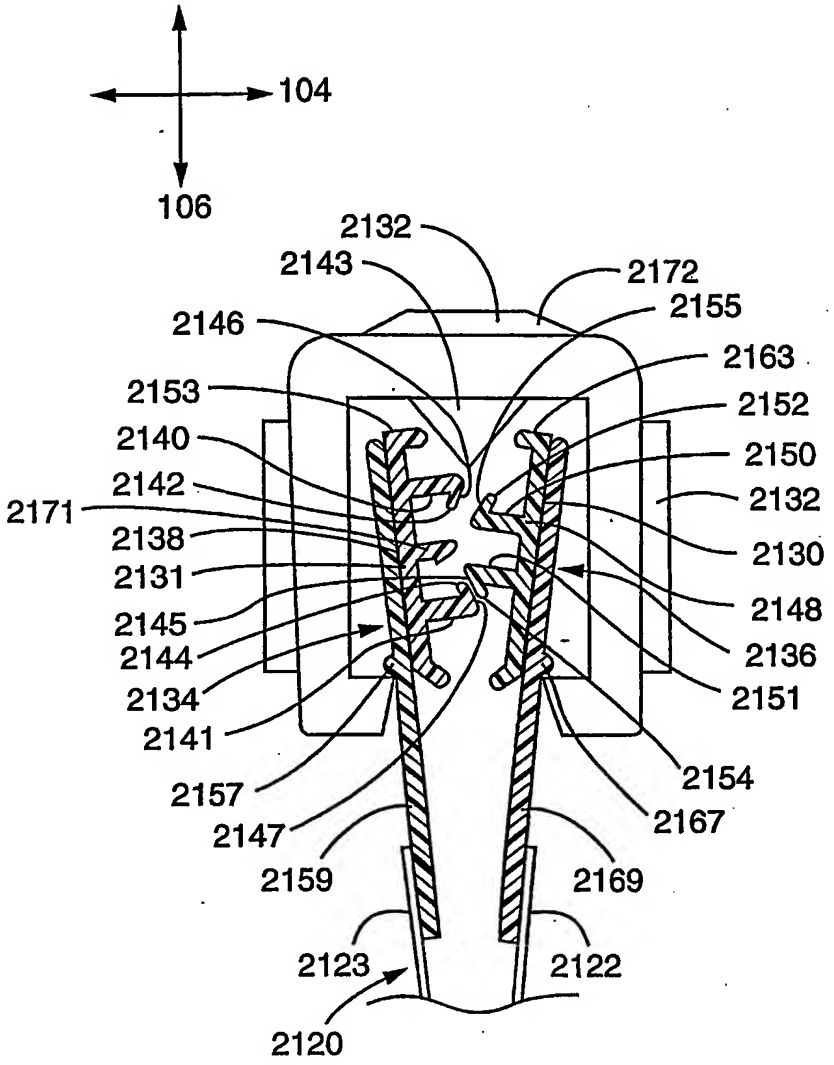
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FIG. 24

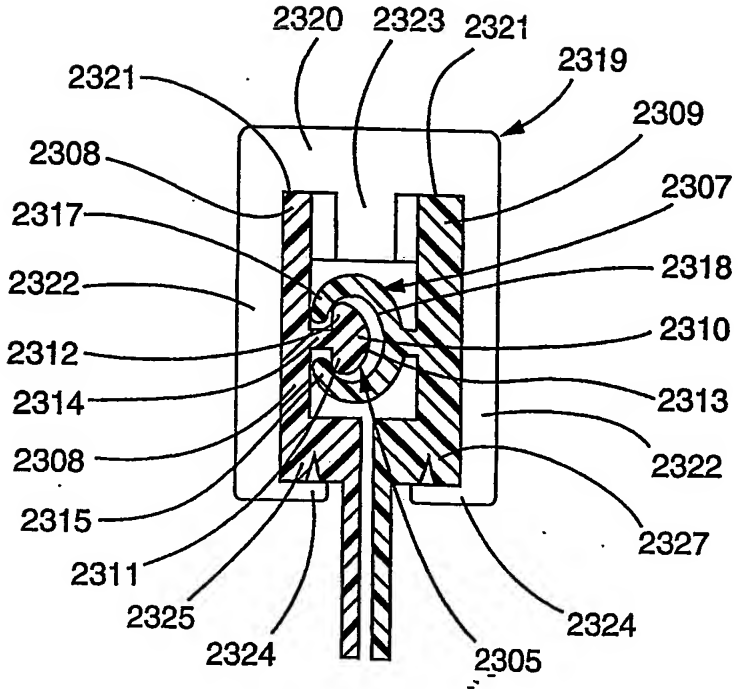
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FIG. 25

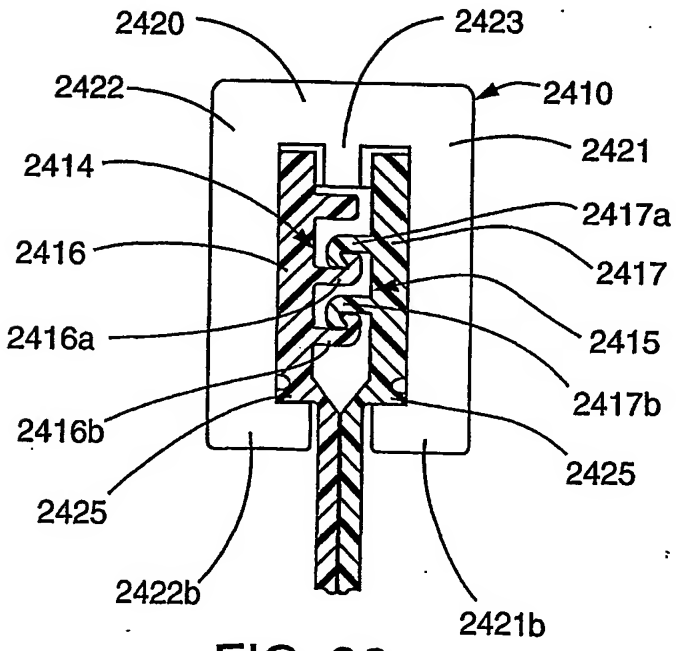
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FIG. 26

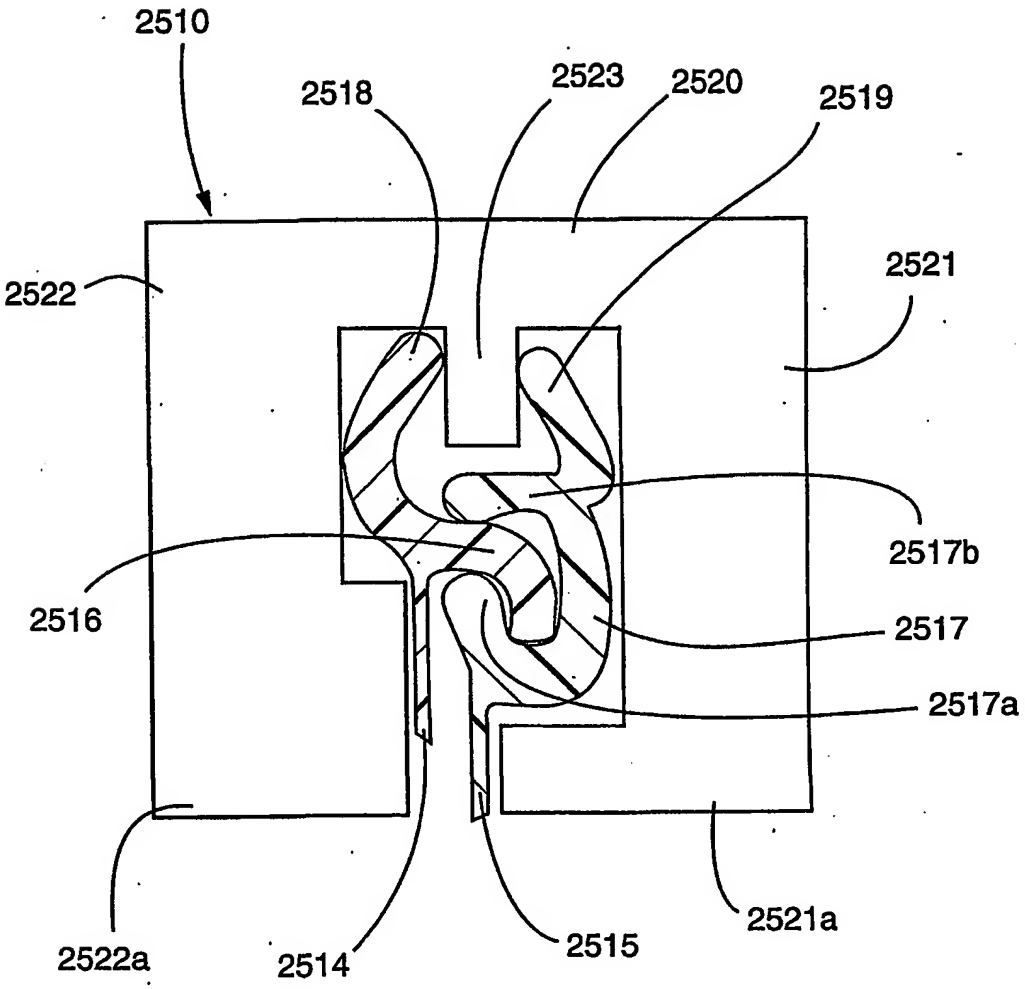
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FIG. 27

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/24553

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7) :A44B 19/30 ; B65B 61/18 ; B65D 33/30
US CL :24/435, 436, 400, 587 ; 383/63, 65 ; 53/412
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 24/435, 436, 400, 587, 390, 399, 433 ; 383/63, 65 ; 53/412

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,931,582 A (NICHOLS) 03 AUGUST 1999 ; SEE THE ENTIRE DOCUMENT .	1 - 44
Y	US 5,672,009 A (MALIN) 30 SEPTEMBER 1997 ; SEE THE ENTIRE DOCUMENT .	1 - 44
Y	US 5,664,299 A (PORCHIA ET AL) 09 SEPTEMBER 1997 ; SEE THE ENTIRE DOCUMENT .	1 - 44
Y	US 4,561,109 A (HERRINGTON) 24 DECEMBER 1985 ; SEE THE ENTIRE DOCUMENT .	1 - 44
Y	5,836,056 A (PORCHIA ET AL) 17 NOVEMBER 1998 ; SEE THE ENTIRE DOCUMENT .	1 - 44
Y	US 5,448,807 A (HERRINGTON, JR.) 12 SEPTEMBER 1995 ; SEE THE ENTIRE DOCUMENT .	1 - 44

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 08 NOVEMBER 2000	Date of mailing of the international search report 05 JAN 2001
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer VICTOR SAKRAN Telephone No. (703) 308-2224

Form PCT/ISA/210 (second sheet) (July 1998)★

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/24553

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3,672,008 A (MOERTEL ET AL) 27 JUNE 1972 ; SEE THE ENTIRE DOCUMENT .	1 - 44
Y	US 3,964,137 A (KIHARA) 22 JUNE 1976 ; SEE THE ENTIRE DOCUMENT .	1 - 44
Y	US 4,233,099 A (McGUIRE) 11 NOVEMBER 1980 ; SEE THE ENTIRE DOCUMENT .	1 - 44
Y	US 5,405,478 A (RICHARDSON ET AL) 11 APRIL 1995 ; SEE THE ENTIRE DOCUMENT .	1 - 44
Y	US 5,871,281 A (STOLMEIER ET AL) 16 FEBRUARY 1999 ; SEE THE ENTIRE DOCUMENT .	1 - 44
Y	US 5,007,143 A (HERRINGTON) 16 APRIL 1991 ; SEE THE ENTIRE DOCUMENT .	1 - 44
Y US 3,806,998 Y	US 3,806,998 A (LAGUERRE) 30 APRIL 1974 ; SEE THE ENTIRE DOCUMENT .	1 - 44
Y	US 5,956,924 A (THIEMAN) 28 SEPTEMBER 1999 ; SEE THE ENTIRE DOCUMENT .	1 - 44
Y	US 5,820,496 A (BERGERON) 13 OCTOBER 1998 ; SEE THE ENTIRE DOCUMENT .	1 - 44